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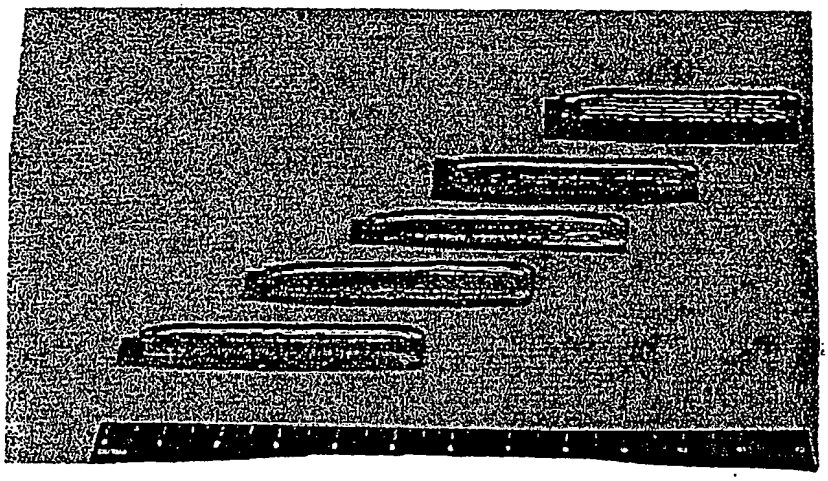
(54) Title: REFRACTRORY METAL AND ALLOY REFINING BY LASER FORMING AND MELTING



(57) Abstract: A process to chemically refine and consolidate tantalum, niobium and their alloys to a fabricated product of net shape or near-net shape with higher throughput, more consistency, and lower manufacturing costs compared to prior art routes or rejuvenate damaged and deteriorated refractory metal parts. Powder metal is loaded into hoppers to be fed into laser forming/melting equipment. A suitable substrate is loaded into a laser forming/melting chamber onto which the powder will be deposited and consolidated in a point-scan process. As the powder is fed onto successive points of the surface of the substrate in linear traces, the laser is used to heat and partially melt the substrate and completely melt the powder. A combined deposition and melt beam traces the substrate surface repeatedly over a selected area to build up a dense coating of controlled microstructure in multiple layers. A fully dense deposit is built up that becomes the desired shape.

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